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XXXV. *A Method proposed to restore the Hearing, when injured from an Obstruction of the Tuba Eustachiana. By Mr. Jonathan Wathen, Surgeon, in Devonshire-Square.*

Read May 29, 1755. **W**Hatever obstructs that passage leading from the ear into the nose, called tuba Eustachiana, so as to hinder the ingress of the air through it into the cavity of the tympanum, is, I believe, universally esteemed destructive to the sense of hearing. Hippocrates observed, that in a quinsy of the fauces, the patient became deaf, by its compressing and closing up this tube (*a*). Many practical writers assert the same to have happened from adjacent ulcers, &c. (*b*); and I have known a swelled tonsil occasion deafness.

This canal opens into the lateral and anterior part of the cavity of the tympanum; is so shaped that it first decreases, as it descends towards the posterior part of the nose, becoming very narrow; then suddenly diverging, is much enlarged, opening into the

(*a*) Coac. II. n. 35.

(*b*) Haller in Boerhav. de auditu, p. 380, and 416. Tulpus l. n. 35. a tumore palati. Valsalva, cap. v. pag. 90. a polypo. & ulcere (*viz.* a certain yeoman had an ulcer above the uvula, on the left side, which communicated with, and corroded part of, the orifice of the left tuba eustachiana; which, when he stopp'd with a tent dipped in medicine, he immediately lost his hearing in that ear, but recovered it as soon as the tent was taken out).

posterior part of the nose by an elliptic orifice, a little prominent, turning inwards and forward, placed laterally, and just above the velum pendulum palati. This canal then is composed of two distinct cones, the extremities of which unite together, but their bases diverge differently: it is likewise lined with a porous membrane, full of criptæ and mucous cells, continued from and like to the membrane of the nares (c).

When therefore we consider the structure of the eustachian tube, and its free communication with the atmosphere, we may reasonably suppose it subject to inflammation of its membrane, and concretion of its mucus, from cold, &c. like the external meatus; and although its mucus is of a very different nature, it is nevertheless liable to inspissate by heat, when its thinner parts are exhaled *.

And from the form of this passage we may easily conceive, that an obstruction, pretty far advanced, is not to be removed without difficulty, and that in proportion, as it is more or less complete, the hearing will be more or less injured. Why then may not this be suspected, as sometimes the cause of deafness? Perhaps it is not unfrequently so: *e. g.* When

(c) Haller in Boerh. de Auditu, pag. 378: Not. e Physiologia. Haller. de Auditu, §. 485. Valsalva, cap. 2. pag. 32. idem Fig. XIV.

* Morgagni and others tell us, that they constantly find the cavity of the tympanum in infants always much clogged with mucus; and Mr. Douglas has often observed the same in adults, and is of opinion that it is concomitant with an obstructed tube in general, and that the injection is equally as effectual as if the tube only was obstructed.

a patient is somewhat deaf from cold, and the outer ear has been examined, and found clear of harden'd wax, &c. it is nevertheless not uncommon to find himself suddenly relieved by a great noise in his ear (*d*). This is probably owing to the breaking away of the congealed mucus, and the instantaneous rushing of the air into the tympanum; so that when this disorder is but slight and recent, nature seems frequently to relieve herself; but when more confirmed, her efforts are ineffectual for its removal.

These considerations inclined me strongly to think, the hearing might suffer from that cause, and I was much confirmed herein by the following very remarkable case.

Richard Evans, aged thirty-five, was exceeding deaf in both his ears, and no visible disorder in the external meatus. It arose from cold, and had subsisted several years, during which time no art or means whatsoever, could procure him the least relief. In August last he died of the small-pox, at the hospital in Cold-bath fields. I took that opportunity to examine the eustachian tube of each ear, and found them both stuffed quite full of congealed mucus, which was observed by two gentlemen of the profession present. This was the only visible cause of his deafness, the other parts appearing in their natural state.

As all these concurring circumstances strengthened me in my opinion, they likewise incited me to make trial of an operation that was some time ago proposed

(*d*) Haller in Boerhaav. de Auditu, pag. 381. not. g.

to the Academy of Sciences, by Monsieur Guyot; but the author having never practised it, he wanted the recommendation of facts to support and enforce it; it was therefore rejected by them as impracticable (*d*).

I first introduced my probe, a little bent at the end, through the nose, into the tubes of several dead subjects; and, having thereby acquired a facility, I did the same on a person that was very deaf, and on whom all other means had proved ineffectual: no sooner had I withdrawn the probe, than he said, he could hear much better. This success excited my further endeavours, so that I had pipes of different sizes adapted to a syringe, and have since injected the meatus internus in the following manner, with success.

The pipe is made of silver, about the size and length of a common probe, and a little bent at the end: this being fixed to an ivory syringe, full of liquor (*viz.* a little mel rosarum in warm water), must be introduced between the ala and septum of the nose, with its convexity towards the upper part

(*d*) Hist. de l'Acad. 1724. pag. 53. Besides, Monsieur Guyot proposed doing it by the mouth, which is quite impossible, as evidently appears to any one that will give himself the trouble to examine into it. Convinced of this, Monsieur Petit (who has lately published a new edition of Palphin's anatomy) proposed, and that learned and skilful anatomist Mr. John Douglas first demonstrated the possibility of, passing the probe, &c. through the nose into the eustachian tube: and this he has constantly shewn to those who have attended his public lectures; and to him I freely acknowledge myself indebted for the hint, by which I was incited to make trial on the living, of an operation of so much importance to mankind.

of the aperture of the nares ; and thus continued backwards, and a little downwards, till it comes near the elliptic orifice ; then its convexity is turned toward the septum, by which the inflected extremity enters the tuba eustachiana with ease : the liquor is then impelled through it into the tube, by which the fordes, if any, being diluted, is washed out, and regurgitates through the nose, or mouth, or both, with the injection ; and, if the quantity be large, may be seen.

November 3, 1754. M— S— about forty years of age, being troubled with a very considerable deafness, so that she could not hear any thing said at a common distance, except the voice was very loud and shrill ; people were therefore obliged to speak into her ears. This rendered her incapable of service ; so that her mistress resolved to dismiss her : it was of two years continuance, but growing much worse of late, and originally caused by cold, I syringed her outward ears first of all, without the least benefit ; but as soon as the internal meatus was injected, she instantly affirmed, that she heard much better ; and by repeating it for two or three days, she heard, and continues to hear, almost as well as any body, and remains in her place.

November 17, 1754. S— L— aged fifty, applied to me for relief of a deafness in both ears, that had subsisted for a year and an half, and was the effect of a cold : he could not hear what was said, without a most violent exertion of the voice, and applying one's mouth close to his ear ; nor could I make him hear at all ; so that I was obliged to converse with him by means of a person that had a more loud and shrill voice. Having syringed his outward

ears without any success, the next day I injected the tube on one side, and washed away a very considerable quantity of congealed mucus, in little clots of a blackish colour and putrid smell, regurgitating with the liquor through his mouth, he immediately heard what was said by some persons talking in another part of the room. The morning following I did the other ear, and with the same success; and by repeating the operation for two or three times in as many successive days, he can now hear a common conversation; and, if near, distinguish what is said, though the voice be very soft and low, but cannot hear sounds at a great distance.

November 18, 1754, L— threescore years of age, having been exceeding deaf for thirty years, desired to have this operation performed on one of his ears. I first injected the external ear of the right side, and extracted a large plug of inspissated wax; but this did not relieve him in the least. The next day I syringed the tuba eustachiana of the same side; he could then distinctly hear the ticking of his watch, applied close to his ear, which he could not do before nor since: his deafness returned again in the evening: I repeated the operation two mornings more, whose effects were exactly the same as the first.

November 20, 1754, E— H— had been so exceeding deaf (from a cold) for six years, that she was incapable of any kind of employ whatever. I tried this operation, and continued its use, every other day for a fortnight. The benefit that she received, though not equal to the second case, is nevertheless so great, that she can now wait at table, hear what is said pretty well, though not spoke directly
to

to her, and is become very useful in the family where she lives. This is the more extraordinary, as her external ears have a continual spasmodical motion, which indicates a disordered state of the nerves of her ears.

November 30, 1754, A — aged twenty-seven, deaf in both ears, from cold, and of two years standing, one much worse than the other, I began with the deafest, and extracted much wax, &c. from the external meatus, without the least benefit; but on syringing the tube of that ear, she received so much relief that she can hear considerably better with it than the other. I then injected the other ear, on which it produced no alteration at all, though repeated several times.

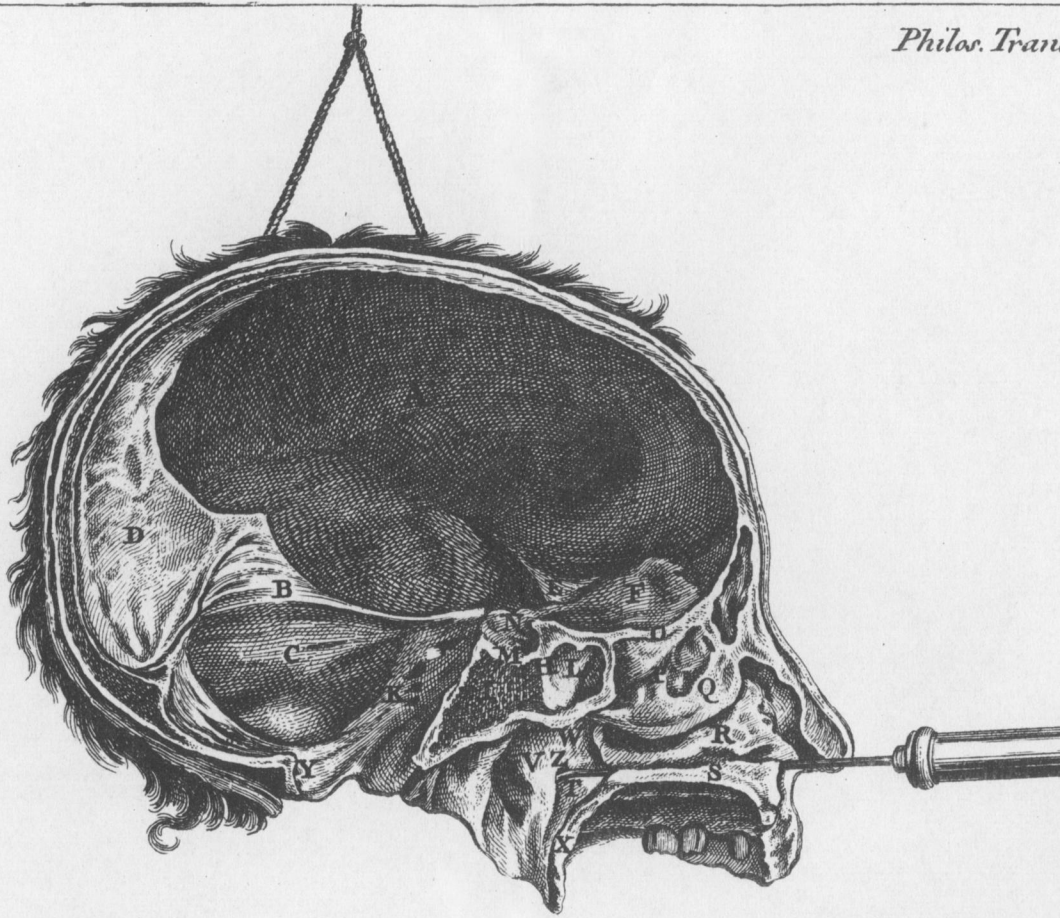
February 1, 1755, A — A — deaf to the greatest degree imaginable, could understand only one particular person, whose voice, or rather physiognomy, he had long been used to. He had been thus for eighteen years, and was suddenly seized, or as it were struck, with this disorder, together with an affection of his eyes, which presented a variety of colours continually floating before them, to the great detriment of his sight; and this, together with his deafness, has continued, with very little alteration, till the latter-end of January last, about which time I syringed his eustachian tubes, by which he instantly heard his own voice, which he could not in the least before. I repeated the operation for three or four times, at a day or two distance from each other. He soon perceived a remarkable alteration for the better, together with this peculiar circumstance, that if spoke to as loud as was before necessary, the sound irritated his ear, causing a very painful titillation, or (as

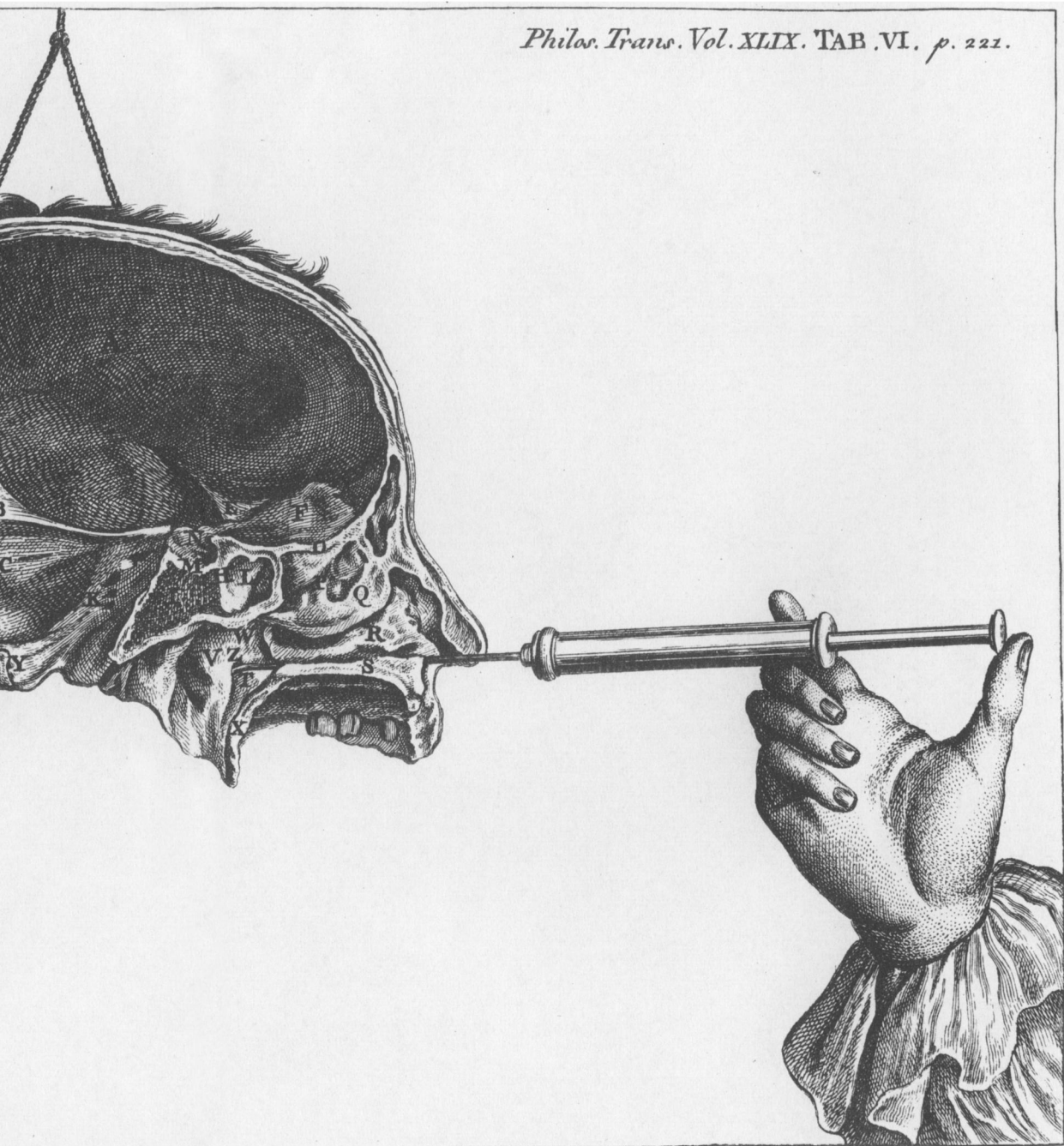
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he

he himself termed it) a scratching in his ear. The same thing happened when he spoke, nor could he distinguish what himself or others said, except the voice was many degrees softer than he had long been used to: he can now hear a middle-ton'd voice, and converse with others very tolerably, if the room be quiet, and free from noise. He formerly taught the learned languages, by which he acquired three hundred pounds; all which he has spent in fruitless endeavours to regain his hearing. He has been twice deeply salivated, and his head profusely sweated for a long time together, and has undergone several physical courses; but nothing ever procured him the least help, till this operation was used; and it is remarkable, that the disorder of his eyes disappear'd after the second time his ears had been injected. Thus five out of the six cases received more or less benefit from the operation; without which they must probably have ever remained as they were, hopeless, and destitute of help.

I have endeavoured to ascertain the symptoms that indicate an obstructed tube, but have not been able to do it with any degree of certainty; nor can I see the great utility of it, could it be done; for the only disorders of the ear, that at present admit of chirurgical helps, are those of the external meatus, ulcerated and swell'd tonsils, &c. all of which are generally visible; and when they are not the cause of deafness, little or nothing is ever attempted, the patient being left to shift for himself. But now another probable chance at least is given to the unhappy sufferer, and being the only one (*e. g.* the others either improper, or tried before without success),





cesses), may be made use of without delay, or attendance to corroborating symptoms, at least till they render themselves more conspicuous and certain than I have hitherto been able to find them : and as the operation is not at all dangerous, it neither has, nor will, I believe, be thought painful by those who desire to recover their hearing.

Explanation of the References in PLATE VI.

- A*, The cavity of the cranium, containing the cerebrum.
- B*, Process of the dura mater, called tentorium.
- C*, Cavity containing the cerebellum.
- D*, Posterior process of the dura mater.
- E*, Transverse spinous process of the sphenoid bone.
- F*, Orbiter process of the frontal bone.
- G*, Frontal sinus.
- H*, Body of the sphenoid bone.
- I*, Spongy substance of its body.
- K*, Holes in the sphenoid bone, through which the 3d, 4th, 5th, and 6th pair of nerves pass out of the cranium.
- L*, Sphenoidal sinus.
- M*, Sella turcica, in which may be seen
- N*, The glandula pituitaria.
- O*, Cribriform lamella of the ethmoid bone.
- P*, Cellulæ ethmoidæ.
- Q*, Os spongiosum superius.
- R*, Os spongiosum inferius ; by its concave surface a groove is form'd which serves as a director to the pipe of the syringe, in its course to the tuba eustachiana.

S, Palatine

- S*, Palatine process of the os maxillare, whose upper surface is strictly a horizontal plane, and not convex, from behind forward, as is always, tho' very unjustly, painted.
- T*, The orifice of the tuba eustachiana, whose posterior edge
- V*, is cartilaginous and prominent, forming a resistance to the extremity of the instrument, when push'd against it.
- W*, The upper and lateral part of the fauces.
- X*, Velum pendulum palati.
- Y*, Part of the foramen magnum occipitis.
- Z*, The infected extremity of the syringe in the orifice of the tuba eustachiana.
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XXXVI. *Tentamen Chemicum de Calcis vivæ
Actione in Salem volatilem alcalinum.
Auctore Johanne Alberto Schlosser, Ultra-
jectino, M. D.*

Read June 5, 1755. **P**ostquam chemicorum solertia salium alcalinorum volatilium in genere omnium, e quacunque re artis vel naturæ viribus productorum, veras dotes atque characteres invenerat, constitit, salia hæcce diverso nomine a corpore, unde separata fuerant, petito, insignita, et ab imperitis ad hæc usque tempora haud raro pro diversis habita, quoties probe depurata fuit, omnia eisdem præcise gaudere dotibus, nullamque amplius inter se admittere differentiam. Ast simul artis chemicæ seduli observarunt, calcem (ut aiunt) vivam sali huic volatili alcalino